MODEL 6100 AND 6101 SIGNAL PROCESSOR

SERVICE NOTES

March, 1971

Scientific-Atlanta, Inc.

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INSTALLATION NOTES

AGC SET-UP OPERATE SWITCH

The AGC switch on the rear panel is provided to give the correct AGC set-up for overall sweep alignment of the processor. It should be left in the OPERATE position for normal operation. In the SET-UP position, the switch applies a zener diode regulated 5.5 vDC to the video IF AGC line and grounds the Delayed AGC line to the input converter.

RECOMMENDED INPUT LEVEL

The recommended input level for the processor is +5 to +10dBMV. Input levels in excess of +10 dBMV should be padded to that value so that the processor will operate in the center of the dynamic range of the AGC circuit (-10 to +30 dBMV). One exception to this is Channel 6 which should be padded to 0 dBMV if it exceeds that level.

RECOMMENDED OUTPUT LEVEL

The recommended output level for the processor is +50 dBMV to +55 dBMV for the video and +35 dBMV to +40 dBMV for the sound. If these output levels are not sufficient, the processor may be run at a higher level, however, output levels of +55 to +60 dBMV will require the use of a good bandpass filter on the output to eliminate the possibility of adjacent channel interference. The combining network should be designed to avoid output levels in excess of +55 dBMV if at all possible.

EMERGENCY ALERT AND ALTERNATIVE PROGRAM SYSTEMS

Separate sound and video IF signals are available at the input converter outputs ahead of the IF amplifiers to facilitate the installation of an emergency alert system or automatic program switchover for non-duplication of programming.

In the event the nonduplication switcher provides insufficient isolation of

IF channels, the offending input converter may be disabled by connecting pins 1 and 4 of the switching input connector located on the rear chassis apron.

In the event nonduplication switching is not required, be sure to install enclosed jumper cables between connectors J3/J7 and J4/J8.

GENERAL TROUBLESHOOTING PROCEDURE

1. Check to see that a usable signal level is available at the processor RF input connector (-10 dBMV to +10 dBMV, pad input to +10 if the signal level is higher than +10 dBMV) or 0 for Channel 6.

2. Check to see that all modules are firmly plugged in.

3. Check jumper cables on back of chassis for continuity and tightness.

4. Check local oscillator slide switches on back of input and output converters for correct position (input and output on same channel - switches in ON CHANNEL position. Input and output on different channels, switches in OFF CHANNEL position.)

5. Check power supply for correct output voltages (+14V and -6V).

6. Check AGC switch on rear of chassis. Switch should be in OPERATE AGC position. (This switch on late production units only.)

7. Check Video IF module for proper AGC adjustment. (See procedure in 6100 manual.)

8. Set Input Converter sound trap (early production only). Do not adjust on Model 6100 S/N 594 and higher or on Model 6101 S/N 30 and higher.

If the above checks do not correct the problem, see the following list of specific problems and likely cures.

The following tests are made with a field strength meter connected to one RF OUT connector, and with the other RF OUT connector terminated in a 75 ohm load.

LOW OR NO OUTPUT

1. Shorted RF out put cable in 6100 chassis. Check between center conductor and chassis on each output connector with an ohmmeter. If a short is indicated, locate and correct it.

2. Center contact of RF output connectors spread open. Use scribe to bend contacts back together or replace connector.

3. Output Converter.
   If the sound, video and substitution carriers all read low, the output converter is probably at fault. If the processor is operating ON CHANNEL (input and output on the same channel) temporarily place slide switch on rear of output converter to the OFF CHANNEL position. If normal output is restored the output converter is not matched to the input converter and is not getting sufficient local oscillator signal. See the procedure for matching input and output converters in 6100 manual. (Requires a sweep set-up and a 6100 test fixture.)

4. Substitution carrier and sound carrier level normal, but video level low, fluctuating, or missing.
   (A) Poor or intermittent contact of reed delay in video path through substitution carrier module.
   Cure: Replace reed delay or complete module.
   (B) Defective video IF module
   Cure: Check AGC adjustments. If this does not help, replace module.

5. Substitution carrier level normal but sound and/or video level low or

missing.

(A) Defective Video and/or Sound IF Module

Cure: Replace module.

(B) Defective Input Converter

Cure: Replace module.

IMPROPER OPERATION OF SUBSTITUTION CARRIER AND SIGNAL OFF LAMPS

The signal off lamp and the substitution carrier should come on approximately ten seconds after the antenna is removed.

If the substitution carrier and signal off lamp do not operate properly, remove the antenna from the processor and measure the voltage at the wiper of sensitivity pot R5, to chassis. Adjust R5 for 4.5 VDC. Now check the video IF AGC line for 4.1 VDC. (See AGC adjustment in manual if voltage is incorrect.)

Reconnect the antenna lead to the processor. The Video IF AGC line should rise to between 5 and 6 volts for antenna levels of 0 dBMV to +10 dBMV and the lamp and substitution carrier should go off immediately.

If the AGC voltage rises as outlined above, and light does not go out, check the following:

(A) Meter switch in substitution carrier position. (Model 6100 only).

(B) Bad substitution carrier module. (Relay contacts stuck).

(C) Feed through capacitor C7 of meter circuit (pink wire) touching meter bezel and shorting to ground. (Model 6100 only).

(D) Connector pin (AGC line) of video IF module or chassis receptacle bent or spread so as to not make contact.

(E) Connector pin (AGC line) of substitution carrier module or chassis receptacle bent or spread so as to not make contact.

If the oscillator does not start reliabily at high output levels, adjust tuning slug for maximum output, then back slug up approximately one turn and re-check starting reliability.

POOR AGC ACTION

Go through AGC set-up according to 6100 instruction manual. Replace all AGC pots which are "noisy" or erratic.

WHITE HORIZONTAL BANDS IN PICTURE

(A) Pad antenna input level to +5 or +10 dBMV if it exceeds that level.

(B) Adjust Input Converter Sound trap. (early production only)

(C) Check delayed AGC pot by applying pressure with fingers. If the pot is noisy and appears to be causing the problem, replace it.

CAN NOT TURN SOUND LEVEL DOWN

Adjust Input Converter sound trap according to 6100 manual. (Early production only).

BEATS IN PICTURE

Be sure the signal off the air is clean before working on the processor. Remove the antenna lead from the processor and connect it to a TV set and check the picture quality. If the off air signal is clean, reconnect the antenna lead to the processor and connect the TV set through a suitable pad (approximately 40 dB) to the processor RF out connector. Terminate the other RF out connector in 75 ohms.

If the signal is clean here, reconnect the processor to the system combining network and set up the required operating levels (not to exceed +55 dBMV Video and +40 dBMV sound at the processor output). Go through all the headend electronic equipment and temporarily remove power from each unit while watching for the beat to go away. If the beat is caused by another processor, the offending unit should be

checked for proper operation. Be sure the output levels do not exceed +55 and +40 dBMV.

BEATS GENERATED IN PROCESSOR

If the beat was found to be generated in the processor, the following list may be helpful.

(A) Co-channel type beat (on-channel conversion). Check slide switches on input and output converter for correct position.

(B) CW beat (off-channel conversion). Check slide switches on input and output converter for correct position.

(C) Co-channel type beat when meter switch is placed in video position (6100 only)
Probable cause: Signal off lamp burned out. (The substitution carrier level pot will affect the beat.) Replace lamp and add diode modification.
Possible cause: Defective meter circuit (oscillating). (The substitution carrier level pot will not affect the beat.)
Cure: Replace meter circuit or reduce value of R17 in meter circuit from 2.7K to 2.2K. (Early production only.)

(D) Co-channel type beat controlled by substitution carrier level control.
Possible cause: Substitution carrier operating simultaneously with TV signal due to stuck relay contacts in substitution carrier.
Cure: Replace substitution carrier module.

(E) Herringbone (FM) beat in picture at output of processor but not visible directly off antenna.

(1) If herringbone beat "breaks up" with audio of channel being observed, check to make sure incoming signal level is at the recommended +5 dBMV to +10 dBMV level. Also check to make sure on channel sound trap is properly adjusted (see 6100 manual).

(2) If herringbone beat does not "break up" with audio of channel being observed, check signal levels off of antenna and make sure that

adjacent channel levels are not higher in magnitude than desired signal. If they are, try trapping them or using a bandpass filter.

(F) "Windshield Wiper" effect in picture at output of processor but not visible directly off antenna.

(1) Check signal levels off antenna and make sure that adjacent channel levels are no higher in magnitude than desired signal. If they are, try trapping them or using a bandpass filter.

SOUND TRAP ADJUSTMENT

This procedure requires a field strength meter that will tune to 41.25 MHz such as a Jerrold Model 727. (An alternate procedure, requiring a sweep set-up follows the first procedure.)

(A) Apply a normal level TV signal to the processor input.

(B) Remove rear panel jumper cables from connectors J3 (Video IF OUT), and J4 (Sound IF OUT).

(C) Connect an "F" cable from J4 to field strength meter. (FSM)

(D) Tune the FSM to 41.25 MHz and obtain an on-scale reading. Listen to the signal on the built-in speaker to be sure the sound carrier has been tuned in and not the color subcarrier.

(E) Remove the FSM cable from J4 and connect it to J3. (Do not touch FSM tuning for this and remaining steps.) Adjust FSM attenuators, if necessary to obtain on-scale reading.

(F) An input converter extender, SA Part No. 65935, can be used to gain access to the intput converter sound trap adjustments. If an extender is not available, it will be necessary to remove the processor bottom cover.

(G) Alternately adjust input converter coil L6 and potentiometer R10 for minimum sound output level as indicated on the FSM.

(Clearance holes for these adjustments are provided in the converter cover plate.)

It will be necessary to remove attenuation from the FSM as the signal is minimized.

(Note that it is normal for the signal level to fluctuate with modulation.)

(H) When the sound signal has been minimized, disconnect the FSM, replace the jumper cables, and remove the extender if one was used.

This completes the adjustments.

SOUND TRAP ADJUSTMENT

(SWEEP METHOD)

An alternate method is to sweep the input converter. This method will require an accurate marker at the sound carrier frequency.

(A) Adjust input converter Coil L6 to center the sound notch on the marker.

(B) Adjust potentiometer R10 for maximum notch depth.

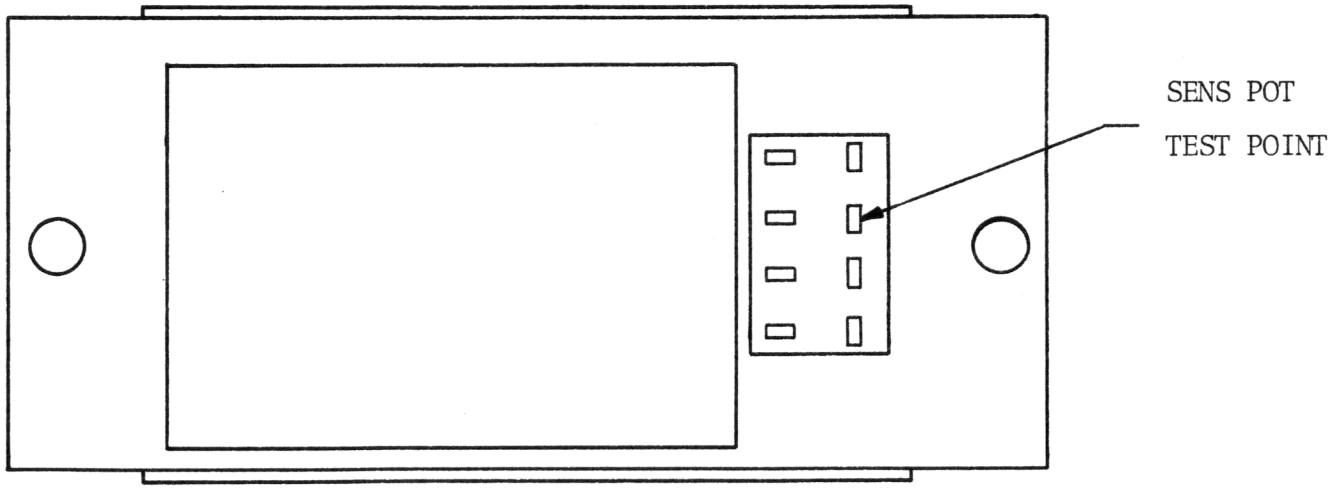
(C) Recheck notch frequency.

This completes the sound trap adjustment.

SENSITIVITY CONTROL (R5) ADJUSTMENT

(1) Connect a VOM between the SENS POT test point on the rear panel and the chassis.

If the processor does not have the rear panel test point socket, remove the substitution carrier module cover and connect the VOM to the point indicated in the drawing below.



(2) Adjust Pot R5 for 4.5 VDC. If the substitution carrier does not operate properly after making this adjustment, see troubleshooting section of manual.

DYNAMIC TEST OF PROCESSOR AGC

This test should be made with a +10 dBMV television signal applied to the RF input of the processor. (Do not make this test with a CW signal.) Note the output level of the processor and then attenuate the input signal 20 dB. If the output level drops 1 dB or less, the AGC action meets specifications.

In practice it has been found that no measurable output level change is seen as the signal is increased from +10 dBMV to +30 dBMV, so this test is not considered necessary. (A signal level of +30 dBMV is not generally available anyway.)

The dynamic range of the AGC is -10 dBMV to +30 dBMV, or 40 dB total.

If the change in output level is greater than 1 dB, check the following:

(1) AGC and delayed AGC adjustments.

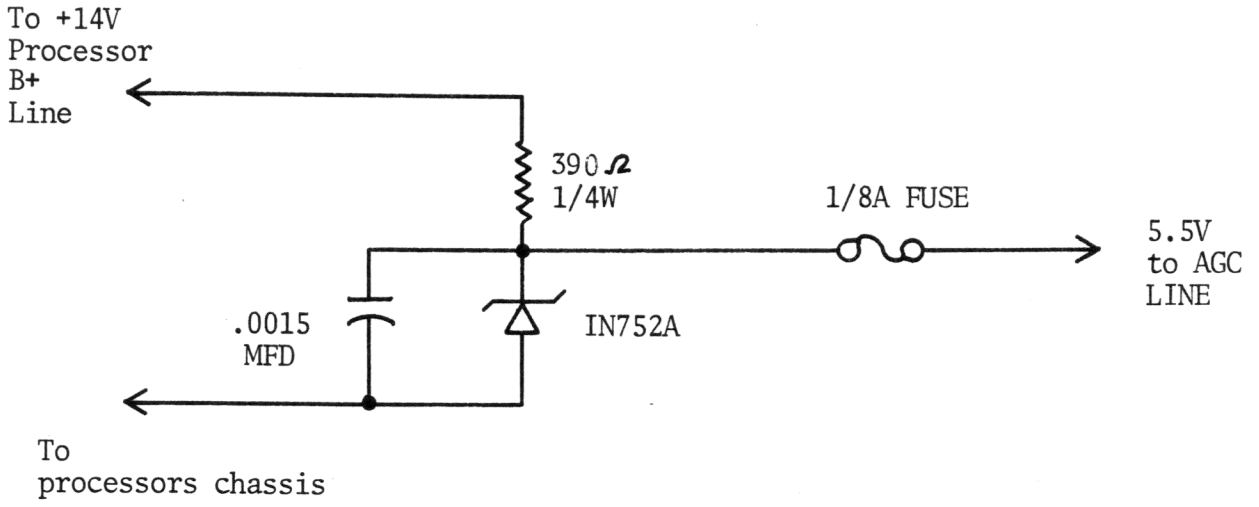
(2) AGC coil A3L23 for correct tuning by adjusting for a minimum output level from processor as indicated on a field strength meter or the front panel meter of a Model 6100 processor. (Use signal input level of +10 dBMV while adjusting A3L23.) Recheck delayed AGC pot adjustment if L23 was detuned.

OVER-ALL SWEEP OF PROCESSOR

(1) Remove jumper cable on rear panel of processor from J8, sound IF IN, and terminate J8 with a 75 ohm load.

(2) Place the rear panel AGC switch in the AGC SET-UP position. (For early production units without this switch, perform steps A and B.)

(A) Connect a 5.5 V DC supply to the Video IF AGC line. A suitable supply can be made with a zener diode and a resistor as shown below. (See AGC adjustment procedure for location of AGC line)



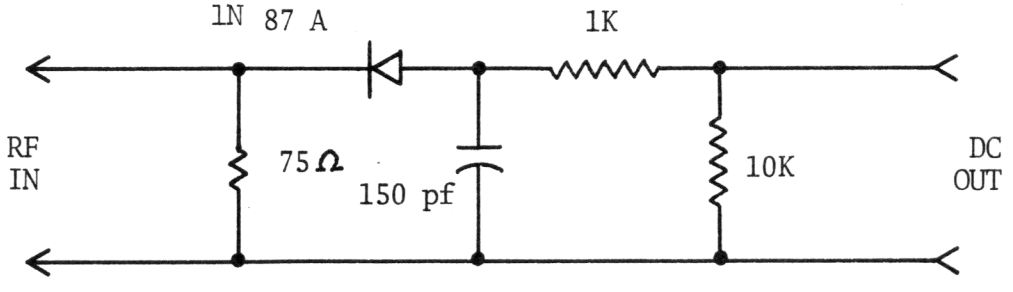
(B) Short the Video IF delayed AGC line to chassis with a clip lead.

(3) Set the VIDEO LEVEL control on front panel approximately mid-range.

(4) Connect the output of a sweep generator through a 75 ohm step attenuator and then to connector J2, RF In on rear panel of processor.

(5) Terminate one of the RF OUT connectors with a 75 ohm load.

(6) Connect an RF detector to the other RF OUT connector. The circuit for a suitable detector is shown below.



(7) Connect the DC OUT connector to the vertical input of an oscilloscope. Set the scope vertical sensitivity to 50 millivolts per centimeter.

(8) Adjust the sweep generator center frequency to the Input Converter channel to be swept. Adjust the sweep generator amplitude and sweep width for a display approximately four centimeters high and approximately four centimeters wide.

(9) If the sweep response is tilted, adjust the BOTTOM slugs of coils L12, L14, or L16 of Video IF Module.

VOLTAGE CHART

Voltage measurements are included in this manual as a maintenance aid. Please note that these measurements are subject to a ±20% variation from unit to unit due to component tolerances and transistor variations.

These voltages were measured with a Triplet 630 APL meter (20,000 ohms per volt) using the chassis ground as a reference point and with an AC line voltage of 120 volts.

All voltages were taken with no signal applied unless otherwise specified.

A1 Meter Circuit (Model 6100 only)

	Emitter	Base	Collector
Q1	5.0v	5.8v	9.5v
Q2	5.5v	6.2v	14.0v
Q3	1.0v	0.0v	14.0v
Q4	1.0v	0.0v	14.0v

Meter circuit voltages taken with meter switch in VIDEO position and with +10 dBMV signal applied to RF in connector.

A2 Power Supply

	Emitter	Base	Collector
Q1	6.0v	6.6v	14.5v
Q2	13.8v	14.5v	18.0v

REFERENCE

A3 VIDEO IF

	Emitter		Base		Collector	
	+ 10 dBmv Signal	No Signal	+ 10 dBmv Signal	No Signal	+ 10dBmv Signal	No Signal
Q1	0.75	0.75v	0 v	0 v	13.8v	13.8v
Q2	4.3v	3.1v	5.0v	4.1v	11.5v	11.5v
Q3	4.3v	3.2v	5.0v	3.9v	11.5v	11.5v
Q4	4.2v	3.1v	5.0v	3.8v	13.5v	13.5v
Q5	3.2v	3.2v	4.0v	4.0v	13.5v	13.5v
Q6	-0.25v	-0.25v	-0.6v	-0.9v	- 0.85v	- 0.3v
Q7	9.8v	10.1v	9.0v	9.3v	5.8v	4.1v
Q8	10.5v	11.0v	11.0v	12.0v	13.5v	13.5v
Q9	0.25v	0.2v	0.9v	0.75v	11.0v	12.0v
Q10	0 v	0 v	0.6v	0.6v	0.07v	0.07v
Q11	0.9v	0.75v	1.5v	1.3v	10.0v	10.0v
Q12	1.6v	1.6v	2.2v	2.2v	12.5v	12.5v

A4 SOUND IF

	Emitter		Base		Collector	
	+10 dBmv Signal	No Signal	+10 dBmv Signal	No Signal	+10 dBmv Signal	No Signal
Q1	4.1v	2.6v	4.8v	3.4v	12.5v	12.5v
Q2	4.1v	2.8v	4.8v	3.4v	12.5v	12.5v
Q3	2.7v	2.7v	3.3v	3.3v	13.8v	13.8v
Q4	2.7v	2.7v	3.4v	3.4v	10.5v	10.5v
Q5	14.0v	14.0v	13.3v	13.3v	6.1v	3.6v

Conditions of measurement: No signal voltages taken with no signal applied to processor and with sensitivity pot R5 set maximum counterclockwise

A5 SUBSTITUTION CARRIER

	Emitter		Base		Collector	
	+10 dBmv Signal	No Signal	+10 dBmv Signal	No Signal	+10 dBmv Signal	No Signal
Q1	5.2v	4.7v	4.5v	4.4v	0 v	0 v
Q2	5.2v	4.7v	5.5v	4.1v	-0.4v	0.75v
Q3	0.25v	0.75v	-0.4v	0.75v	-6.0v	-6.0v
Q4	0 v	0 v	0.25v	0.75v	14.0v	0.05v
Q5	0 v	2.2v *	0 v	2.64v*	0 v	14.0v *

*Q5 Voltage measurements taken with Substitution Level control fully clockwise

REFERENCE

A6 INPUT CONVERTER (All channels)

	Emitter	Base	Collector
Q1	0.5v	-0.25v*	13.0v
Q2	2.8v	3.2v	13.7v
Q3	2.2v	2.8v	12.5v
Q4	2.6v	3.2v	13.0v
Q5	3.6v	4.1v	13.8v
Q6	2.8v	3.0v	13.8v

* -1.0v with +10 dBmv signal

A7 OUTPUT CONVERTER Channels 2 through 6

	Emitter	Base	Collector
Q1	3.0v	3.1v	12.0v
Q2	1.8v	2.3v	11.5v
Q3	1.8v	2.5v	13.0v
Q4	4.5v	5.0v	13.8v

Note: All voltage measurements taken with switch SI in OFF CHANNEL position

A7 OUTPUT CONVERTER Channels 7 through 13

	Emitter	Base	Collector
Q1	2.6v	3.2v	13.0v
Q2	2.2v	2.8v	13.8v
Q3	2.1v	2.6v	13.8v
Q4	4.5v	4.9v	13.8v
Q5	1.3v	2.0v	12.0v

Note: All votage measurements taken with Switch SI in OFF CHANNEL position

A8 SECOND SOUND TRAP (Not used on early production)

	Emitter	Base	Collector
Q1	2.1v	2.7v	12.5v
Q2	2.5v	3.1v	13.0v

MODIFICATION KIT FOR UPDATING
MODEL 6100 & 6101 SIGNAL PROCESSORS

Two modification kits are available to improve the operating reliability and stability of older signal processors. These kits contain all parts and instructions necessary to install the modofications. The two kits are described below:

Signal Processor Modification Kit Group "A"

1. High reliability potentiometers for Video IF AGC Circuits
2. Improved temperature compensation of Video IF output stage Q5 for greater amplitude stability.
3. Addition of low pass filter at output of Sound IF module.
4. Output circuit of standby carrier modified for greater amplitude stability at low output levels.

This modification kit is recommended for Model 6100 processors S/N 1 to approximately S/N 700 and for Model 6101 S/N 1 to approximately S/N 186.

Signal Processor Modification Kit "B"

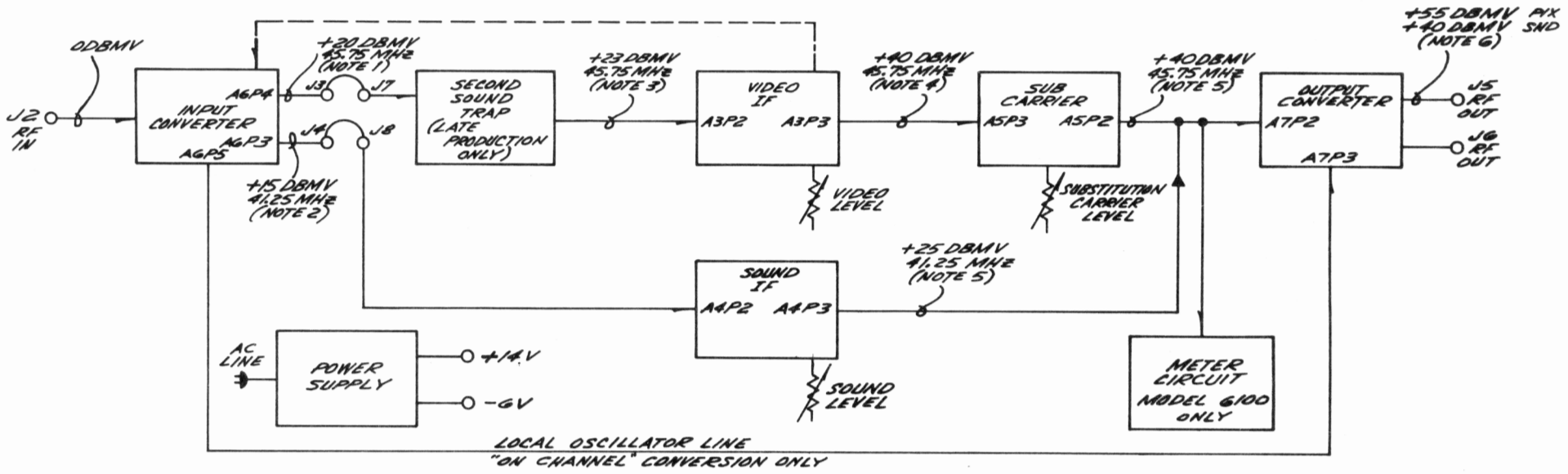
This modification is for addition of the Second Sound Trap module. This modification provides greater attenuation of the on-channel sound signal through the Video IF amplifier, thus providing a cleaner picture and reducing any amplitude modulation of the FM sound signal due to incomplete rejection of the first sound trap in the Input Converter.

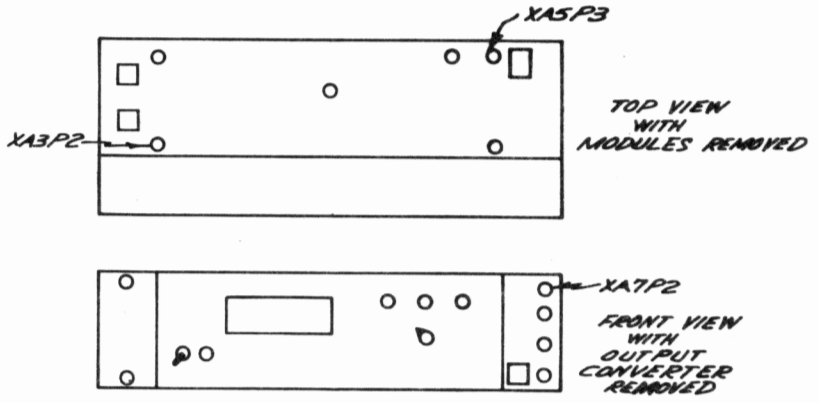
This modification kit is recommended for Model 6100 processors S/N 1 to S/N 593 and for Model 6101 S/N 1 to S/N 30.

Price List

Signal Processor Modification Kit "A"	$ 9.00
Signal Processor Modification Kit "B"	41.00

BLOCK DIAGRAM
MODEL G100 & G101 SIGNAL PROCESSORS
(SIGNAL LEVELS GIVEN AS A SERVICE AID & MAY NOT REPRESENT TYPICAL OPERATION)





NOTES:

1. REMOVE JUMPER CABLE AND MEASURE AT J3
2. REMOVE JUMPER CABLE AND MEASURE AT J4
3. REMOVE VIDEO IF MODULE AND MEASURE AT XA3P2
4. REMOVE SUBSTITUTION CARRIER MODULE AND MEASURE AT XA5P3
5. REMOVE OUTPUT CONVERTER AND MEASURE AT XA7P2
6. MEASURE AT J5 OR J6; TERMINATE UNUSED OUTPUT WITH 75 OHMS